SOP Template: Sequential Calibration Steps for Each Machine Component

This SOP details the **sequential calibration steps for each machine component**, ensuring accurate and consistent performance. It covers the preparation and setup of calibration tools, step-by-step calibration procedures for individual components, verification and adjustment methods, documentation of calibration results, and maintenance of calibration standards. Following these procedures guarantees reliability, precision, and optimal functionality of all machine parts.

1. Scope

This Standard Operating Procedure (SOP) applies to the calibration of all machine components requiring regular adjustment for accurate operation.

2. Responsibilities

- **Calibration Technician:** Performs all steps of component calibration and documentation.
- **Quality Assurance:** Reviews calibration records and ensures compliance with standards.
- **Maintenance Supervisor:** Ensures timely calibration and availability of tools.

3. Required Tools and Materials

- Calibrated reference instruments (as specified for each component)
- Personal protective equipment (PPE)
- Machine operational manuals
- Calibration log sheets or digital records
- Adjustment tools (e.g., screwdrivers, wrenches)
- Cleaning materials
- Calibration standard documents

4. Preparation and Setup

1. Ensure the machine is powered down (if specified by the safety protocol).
2. Gather all required tools and PPE.
3. Verify that all calibration standards and reference instruments are within calibration date.
4. Clean the component and surrounding area to remove debris and contaminants.
5. Review the machine component's calibration specifications in the manual.

5. Component Calibration Procedures

> **Note:** Repeat steps 5.2â€“5.5 for each machine component requiring calibration.

1. **Component Identification:**
   Identify the component to be calibrated (e.g., sensor, pressure gauge, actuator), and record its serial or identification number.
2. **Reference Instrument Setup:**
   Set up the calibration instrument according to the manufacturer's instructions.
3. **Execution of Calibration:**
   - Connect the reference instrument to the component as specified.

- Follow step-by-step calibration method as per the component's requirements (see Table 1 as an example).

4. **Adjustment:**
    - If the measurement deviates from the standard, adjust the component to bring readings within tolerance limits.
5. **Verification:**
    - Verify calibration by repeating measurement.
    - If within limits, proceed; if not, repeat adjustment and verification steps.

Table 1: Example Component Calibration Steps

Component	Reference Standard	Calibration Steps	Tolerance Limit
Pressure Gauge	Digital Pressure Calibrator	1. Apply known pressure increments. 2. Record readings. 3. Adjust zero/span if needed.	±2% Full Scale
Temperature Sensor	Calibrated Thermometer	1. Place sensor in temperature bath. 2. Record temperature readings at set points. 3. Adjust offset/gain.	±1°C

6. Documentation

1. Record the following for each component:
    - Date and time of calibration
    - Component ID/Serial Number
    - Reference standard used (ID/serial, calibration date)
    - Observed readings and adjustments made
    - Technician's name/signature
2. Save records as per company procedure (electronic or paper logbooks).
3. Flag and report any out-of-tolerance components for maintenance/replacement.

7. Maintenance of Calibration Standards

- Ensure all reference instruments are calibrated by an accredited body on a regular schedule.
- Store standards and instruments in controlled conditions to prevent drift or damage.
- Review and update calibration intervals as necessary.

8. Review and Approval

1. Quality Assurance reviews calibration records monthly.
2. Any discrepancies or failures are investigated and resolved.
3. SOP to be reviewed annually or upon change of process/equipment.

9. Revision History

Date	Version	Description	Approved By
2024-06-09	1.0	Initial version	QA Manager